



Fast Metallic Neutral Sporadic Layer a Case Study on 27/08/2019

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Abstract

Mesopause Sodium (Na) and Potassium (K) concentrations are observed simultaneously by a dual-beam Na-K LIDAR deployed at São José Dos Campos (23.1°S, 45.9°W) owing to the Cooperative Agreement between NSSC and INPE. We also used an ionosonde and an all-sky interferometric meteor wind radar data to investigate, respectively, the Es layers and wind behavior, the two equipment are located at Cachoeira Paulista (22.7° S, 45° W). The Sporadic enhancement of neutral metal layers (Ns) concentration within thin layers has been investigated by several authors since its first report by Clemesha et al. (1978). These layers are much thinner than the background layer, their concentrations are at least two times larger than the background layer at that altitude and they last between a few minutes and many hours. On August 27th 2019, a special case of the Sporadic layer was observed, it lasted about 12 min, and the K peak density reached more than two times larger than the background peak concentration. Moreover, the downward phase speed reached 9 km/h which is much faster than the downward movement associated with atmospheric tides (~2 km/h). There was a good correspondence with the Ionospheric Sporadic E layer. And Ion Neutralization mechanism is the most probable source of this Ns layer. However, the speed phase velocity is much larger than the diurnal tide, usually believe to drive the wind shear mechanism which generates the Es layer. This study suggests other dynamical contributions, perhaps gravity waves being the main responsible for this wind shear. Additionally, the meteor rate during the event was larger than the hourly mean rate. This case study helps a better understanding of the formation mechanism involved in the fast sporadic layers.